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Three-dimesional Random Phase Encoding in Volume Holograms and the Applications

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Abstract

Three dimensional shifting sensitivity of volume holograms based on random phase encoding using a ground glass has been theoretically analyzed. There are different shifting tolerances in different shifting directions, which include laterally horizontal, laterally vertical, and longitudinal directions. The shifting sensitivity depends on the diameter of the illumination region on the random phase plate, the thickness of the hologram and the distance between them. We apply the theoretical calculation to a degeneracy condition, a point object, and theoretically analyze the shifting tolerance of shifting multiplexing in holographic storage and holographic confocal microscope.